

We claim:

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1. A computer method, comprising executing at least the following operation in at least one data processing device: establishing a mapping from lists and scalars corresponding to at least one data source into XML elements and attributes.

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2. At least one medium readable by a data processing device and embodying at least one result of the method of claim 1.

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3. A data processing device comprising:
- the at least one medium according to claim 2, and
- at least one processor configured to use the at least one medium to produce an XML document based on the mapping.

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4. The method of claim 1, wherein the at least one data source comprises at least two data sources, and the data sources are of different types.

5. At least one medium readable by a data processor and embodying at least one result of the method of claim 4.

6. A data processing device comprising:

- the at least one medium according to claim 5; and
- at least one processor configured to use the at least one medium to produce an XML document based on the mapping.

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7. The method of claim 1, wherein the data source is a relational database.

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8. At least one medium readable by a data processing device and embodying at least one result of the method of claim 7.

9. A data processing device comprising

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- the at least one medium according to claim 8; and
- at least one processor configured to use the at least one medium to produce an XML document based on the mapping.

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10. The method of claim 1, further comprising executing the following operation in the data processing device:
expressing the mapping in constructs of a mapping language.

11. At least one medium readable by a data processing device and embodying at least one result of the method of claim 10.

5 12. A data processing device comprising

- the at least one medium according to claim 11; and
- at least one processor configured to use the at least one medium to produce an XML document based on the mapping.

10 13. The method of claim 10, further comprising executing the following operation in the data processing device: inserting the constructs into a DTD to create an annotated DTD.

15 14. At least one medium readable by a data processing device and embodying at least one result of the method of claim 13.

20 15. A data processing device comprising:

- the at least one medium according to claim 14; and
- at least one processor configured to
 - use the at least one medium to produce an XML document based on the mapping; and
 - perform the inserting operation.

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X 16. The method of claim 13, wherein the constructs comprise
at least one of a value specification and a binding
specifications.

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17. At least one medium readable by a data processing device
and embodying at least one result of the method of
claim 16.

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18. A data processing device comprising:

- the at least one medium according to claim 17; and
- at least one processor configured to use the at least
one medium to produce an XML document based on the
mapping.

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19. The method of claim 13, wherein

- at least one of the constructs comprises at least one
parameter;
- the at least one of the constructs is adapted so that a
value of the at least one of the parameters is
determinable at a time of generation of at least one
respective XML element associated with the at least one
of the constructs.

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20. At least one medium readable by a data processing device
and embodying at least one result of the method of
claim 19.

5 21. A data processing device comprising:

- the at least one medium according to claim 20; and
- at least one processor configured to
 - use the at least one medium to produce an XML
document based on the mapping; and
 - pass the value to the parameter.

22. The method of claim 1, further comprising executing the
following operation in the data processing device:
associating values and or formulas with a DTD.

23. At least one medium readable by a data processing device
and embodying at least one result of the method of
claim 22.

20 24. A data processing device comprising:

- the at least one medium according to claim 23; and
- at least one processor configured to
 - use the at least one medium to produce an XML
document based on the mapping; and

- perform the associating operation.

25. The method of claim 22, wherein the associating includes associating one or more lists of data objects or formulas producing data objects with each DTD construct having a repetition symbol at the end.

26. At least one medium readable by a data processing device and embodying at least one result of the method of claim 25.

27. A data processing device comprising:

- at least one medium according to claim 26; and
- at least one processor configured to
 - use the at least one medium to produce an XML document; and
 - perform the associating operation.

28. The method of claim 22, wherein the associating includes associating one or more lists of data objects or formulas producing data objects with each DTD construct which is not a #PCDATA, a choice list, or an attribute list, and does not end with a repetition symbol.

29. At least one medium readable by a data processing device and embodying at least one result of the method of claim 28.

5 30. A data processing device comprising:

- the at least one medium according to claim 30; and
- at least one processor configured to
 - use the at least one medium to produce an XML document based on the mapping; and
 - perform the associating operation.

31. The method of claim 22, wherein associating includes associating a value or formula producing a value with each PCDATA, choice list, or attribute definition.

32. At least one medium readable by a data processing device and embodying at least one result of the method of claim 31.

20 33. A data processing device comprising:

- the at least one medium according to claim 32; and
- at least one processor configured to
 - use the at least one medium to produce an XML document; and

- perform the associating operation.

34. The method of claim 22, wherein associating includes, not necessarily in the following order:

- 5 • first associating one or more lists of data objects or formulas producing data objects with a DTD construct;
- second associating at least one of the lists or formulas with at least one variable name; and
- 10 • using the variable name as a parameter in at least one other formula.

35. At least one medium readable by a data processing device and embodying at least one result of the method of claim 34.

36. A data processing device comprising:

- the at least one medium according to claim 35; and
- at least one processor configured to
 - use the at least one medium to produce an XML document; and
 - 20 - perform the associating operation and included operations.

37. The method of claim 1, further comprising executing the following operation in the data processing device:
associating at least one respective environment with a respective XML element to be generated.

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38. At least one medium readable by a data processing device and embodying at least one result of the method of claim 37.

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39. A data processing device comprising:

- the at least one medium according to claim 38; and
- at least one processor configured to
 - use the at least one medium to produce an XML document; and
- perform the associating operation.

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40. The method of claim 37, wherein the at least one environment comprises

- information from a parent XML element of the respective XML element; and
- information from a binding specification of a DTD construct associated with the respective XML element.

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41. At least one medium readable by a data processing device and embodying at least one result of the method of claim 40.

5 42. A data processing device comprising:

- the at least one medium according to claim 41; and
- at least one processor configured to
 - use the at least one medium to produce an XML document; and
- perform the associating operation.

43. The method of claim 37, wherein

- the mapping includes at least one respective specification corresponding to at least one respective XML element;
- the specification comprises at least one parameter for receiving a value upon generation of an XML document; and
- the method further comprises, upon generation of an XML document, sending the at least one parameter a value according to at least one variable/value pair in the at least one respective environment.

44. At least one medium readable by a data processing device and embodying at least one result of the method of claim 43.

5 45. A data processing device comprising:

- the at least one medium according to claim 44; and
- at least one processor configured to
 - use the at least one medium to produce an XML document; and
 - perform the associating and sending operations.

10 46. At least one medium readable by at least one data processing device and embodying software adapted to perform operations comprising: establishing a mapping from lists and
15 scalars corresponding to at least one data source into XML elements and attributes.

20 47. The at least one medium of claim 46, wherein the at least one data source comprises at least two data sources, and the data sources are of different types.

48. The at least one medium of claim 46, wherein the data source is a relational database.

49. The at least one medium of claim 46, further comprising executing the following operation in the data processing device: expressing the mapping in constructs of a mapping language.

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50. The at least one medium of claim 46, further comprising executing the following operation in the data processing device: inserting the constructs into a DTD to create an annotated DTD.

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51. The at least one medium of claim 50, wherein the constructs comprise at least one of a value specification and a binding specifications.

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52. The at least one medium of claim 50, wherein

- at least one of the constructs comprises at least one parameter; and
- the at least one of the constructs is adapted so that a value of the at least one of the parameters is determinable at a time of generation of at least one respective XML element associated with the at least one of the constructs.

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53. The at least one medium of claim 46, wherein the operations further comprise associating values and or formulas with a DTD.

5 54. The at least one medium of claim 46, wherein the associating includes associating one or more lists of data objects or formulas producing data objects with each DTD construct having a repetition symbol at the end.

10 55. The at least one medium of claim 54, wherein the associating includes associating one or more lists of data objects or formulas producing data objects with each DTD construct which is not a #PCDATA, a choice list, or an attribute list, and does not end with a repetition symbol.

15 56. The at least one medium of claim 54, wherein associating includes associating a value or formula producing a value with each PCDATA, choice list, or attribute definition.

20 57. The at least one medium of claim 54, wherein associating includes, not necessarily in the following order:

- first associating one or more lists of data objects or formulas producing data objects with a DTD construct;

- second associating at least one of the lists or formulas with at least one variable name; and
- using the variable name as a parameter in at least one other formula.

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58. The at least one medium of claim 46, wherein the operations further comprise associating at least one respective environment with a respective XML element to be generated.

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59. The at least one medium of claim 58, wherein the at least one environment comprises

- information from a parent XML element of the respective XML element; and
- information from a binding specification of a DTD construct associated with the respective XML element.

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60. The at least one medium of claim 58, wherein

- the mapping includes at least one respective specification corresponding to at least one respective XML element;
- the specification comprises at least one parameter for receiving a value upon generation of an XML document; and

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- the method further comprises, upon generation of an XML document, sending the at least one parameter a value according to at least one variable/value pair in the at least one respective environment.

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61. At least one data processing device comprising:

- means for receiving data from at least one data source;
- at least one processor adapted to perform operations comprising: establishing a mapping from lists and scalars corresponding to the data into XML elements and attributes.

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62. The at least one data processing device of claim 61, wherein the at least one data source comprises at least two data sources, and the data sources are of different types.

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63. The at least data processing device of claim 62, wherein the data source is a relational database.

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64. The at least one data processing device of claim 61, further comprising executing the following operation in the data processing device: expressing the mapping in constructs of a mapping language.

65. The at least one data processing device of claim 64,
further comprising executing the following operation in the
data processing device: inserting the constructs into a DTD
to create an annotated DTD.

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Sub A 66. The at least one data processing device of claim 64,
wherein the constructs comprise at least one of a value
specification and a binding specifications.

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67. The at least one data processing device of claim 64,
wherein

- at least one of the constructs comprises at least one
parameter; and
- the at least one of the constructs is adapted so that a
value of the at least one of the parameters is
determinable at a time of generation of at least one
respective XML element associated with the at least one
of the constructs.

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68. The at least one data processing device of claim 61,
wherein the operations further comprise associating values
and or formulas with a DTD.

69. The at least one data processing device of claim 68,
wherein the associating includes associating one or more
lists of data objects or formulas producing data objects
with each DTD construct having a repetition symbol at the
end.

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70. The at least one data processing device of claim 68,
wherein the associating includes associating one or more
lists of data objects or formulas producing data objects
with each DTD construct which is not a #PCDATA, a choice
list, or an attribute list, and does not end with a
repetition symbol.

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71. The at least one data processing device of claim 68,
wherein the associating includes associating a value or
formula producing a value with each PCDATA, choice list, or
attribute definition.

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72. The at least one data processing device of claim 68,
wherein the associating includes, not necessarily in the
following order:

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- first associating one or more lists of data objects or
formulas producing data objects with a DTD construct;

- second associating at least one of the lists or formulas with at least one variable name; and
- using the variable name as a parameter in at least one other formula.

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73. The at least one data processing device of claim 61, wherein the operations further comprise associating at least one respective environment with a respective XML element to be generated.

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74. The at least one data processing device of claim 73, wherein the at least one environment comprises

- information from a parent XML element of the respective XML element; and
- information from a binding specification of a DTD construct associated with the respective XML element.

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75. The at least one data processing device of claim 73, wherein

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- the mapping includes at least one respective specification corresponding to at least one respective XML element;

- the specification comprises at least one parameter for receiving a value upon generation of an XML document; and
- the method further comprises, upon generation of an XML document, sending the at least one parameter a value according to at least one variable/value pair in the at least one respective environment.

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